



## SEQUENCE LISTING

<110> Carlin, Nils  
Lebens, Michael R.

<110> METHOD OF PRODUCING THY A-DEFICIENT STRAINS OF VIBRIO CHOLERAE, SUCH  
STRAINS AND THEIR USE

<130> CARL3004/JDB

<140> US 09/700,712

<141> 1999-05-21

<150> PCT/EP99/03509

<151> 1999-05-21

<150> SE 9801852-6

<151> 1998-05-26

<160> 15

<170> PatentIn version 3.0

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<212> DNA

<213> Vibrio cholerae

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 Ile Arg Gly Tyr Asp Asn Ala Ala Asp Phe Arg Gln Leu Gly Thr Lys  
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 Thr Trp Asp Ala Asn Ala Asn Leu Asn Gln Ala Trp Leu Asn Asn Pro  
 85 90 95  
 Tyr Arg Lys Gly Glu Asp Asp Met Gly Arg Val Tyr Gly Val Gln Gly  
 100 105 110  
 Arg Ala Trp Ala Lys Pro Asp Gly Gly His Ile Asp Gln Leu Lys Lys  
 115 120 125  
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 Asn Phe Tyr Asn Pro Gly Glu Phe His Met Gly Cys Leu Arg Pro Cys  
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 165 170 175  
 Ser Thr Gln Arg Ser Cys Asp Val Pro Leu Gly Leu Asn Phe Asn Met  
 180 185 190  
 Val Gln Val Tyr Val Phe Leu Ala Leu Met Ala Gln Ile Thr Gly Lys  
 195 200 205  
 Lys Pro Gly Leu Ala Tyr His Lys Ile Val Asn Ala His Ile Tyr Gln  
 210 215 220  
 Asp Gln Leu Glu Leu Met Arg Asp Val Gln Leu Lys Arg Glu Pro Phe  
 225 230 235 240  
 Pro Ala Pro Gln Phe His Ile Asn Pro Lys Ile Lys Thr Leu Gln Asp  
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Gly Ser Gly Trp Thr Arg Glu Gln Val Ser Asp Leu Leu Phe Ala Gly  
50 55 60  
Phe Leu Gly Val Val Ile Gly Gly Arg Val Gly Tyr Val Ile Phe Tyr  
65 70 75 80  
Asn Phe Asp Leu Phe Leu Ala Asp Pro Leu Tyr Leu Phe Lys Val Trp  
85 90 95  
Thr Gly Gly Met Ser Phe His Gly Gly Leu Leu Gly Val Ile Thr Ala  
100 105 110  
Met Phe Trp Tyr Ala Arg Lys Asn Gln Arg Thr Phe Phe Gly Val Ala  
115 120 125  
Asp Phe Val Ala Pro Leu Val Pro Phe Gly Leu Gly Met Gly Arg Ile  
130 135 140  
Gly Asn Phe Met Asn Ser Glu Leu Trp Gly Arg Val Thr Asp Val Pro  
145 150 155 160  
Trp Ala Phe Val Phe Pro Asn Gly Gly Pro Leu Pro Arg His Pro Ser  
165 170 175  
Gln Leu Tyr Glu Phe Ala Leu Glu Gly Val Val Leu Phe Phe Ile Leu  
180 185 190  
Asn Trp Phe Ile Gly Lys Pro Arg Pro Leu Gly Ser Val Ser Gly Leu  
195 200 205  
Phe Leu Ala Gly Tyr Gly Thr Phe Arg Phe Leu Val Glu Tyr Val Arg  
210 215 220  
Glu Pro Asp Ala Gln Leu Gly Leu Phe Gly Gly Phe Ile Ser Met Gly  
225 230 235 240  
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 Gln Met Arg Phe Asn Leu Gln Asp Gly Phe Pro Leu Val Thr Thr Lys  
 35 40 45  
 Arg Cys His Leu Arg Ser Ile Ile His Glu Leu Leu Trp Phe Leu Gln  
 50 55 60  
 Gly Asp Thr Asn Ile Ala Tyr His Glu Asn Asn Val Thr Ile Trp Asp  
 65 70 75 80  
 Glu Trp Ala Asp Glu Asn Gly Asp Leu Gly Pro Val Tyr Gly Lys Gln  
 85 90 95  
 Trp Arg Ala Trp Pro Thr Pro Asp Gly Arg His Ile Asp Gln Ile Thr  
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 Thr Val Leu Asn Gln Leu Lys Asn Asp Pro Asp Ser Arg Arg Ile Ile  
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 Val Ser Ala Trp Asn Val Gly Glu Leu Asp Lys Met Ala Leu Ala Pro  
 130 135 140  
 Cys His Ala Phe Phe Gln Phe Tyr Val Ala Asp Gly Lys Leu Ser Cys  
 145 150 155 160  
 Gln Leu Tyr Gln Arg Ser Cys Asp Val Phe Leu Gly Leu Pro Phe Asn  
 165 170 175  
 Ile Ala Ser Tyr Ala Leu Leu Val His Met Met Ala Gln Gln Cys Asp  
 180 185 190  
 Leu Glu Val Gly Asp Phe Val Trp Thr Gly Gly Asp Thr His Leu Tyr  
 195 200 205  
 Ser Asn His Met Asp Gln Thr His Leu Gln Leu Ser Arg Glu Pro Arg  
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 Pro Leu Pro Lys Leu Ile Ile Lys Arg Lys Pro Glu Ser Ile Phe Asp  
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 Ile Arg Gly Tyr Asp Asn Ala Ala Asp Phe Arg Ala Leu Gly Thr Lys  
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 Thr Trp Asp Ala Asn Ala Asn Glu Asn Ala Ala Trp Leu Ala Asn Pro  
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 Thr Phe Phe Asn Pro Gly Glu Phe Asp Leu Gly Cys Leu Arg Pro Cys  
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 Ile Gln Val Phe Thr Phe Leu Ala Leu Met Ala Gln Ile Thr Gly Lys  
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 Lys Ala Gly Lys Ala Tyr His Lys Ile Val Asn Ala His Ile Tyr Glu  
 210 215 220  
 Asp Gln Leu Glu Leu Met Arg Asp Val Gln Leu Lys Arg Glu Pro Phe  
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 Pro Leu Pro Lys Leu Glu Ile Asn Pro Asp Ile Lys Thr Leu Glu Asp  
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